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### AMENDMENTS TO THE CLAIMS

Claims 1-41 (Cancelled).

42 (Originally Submitted). A method for determining a partial pressure of carbon monoxide in a gas atmosphere comprising a mixture of nitrogen and either an endothermic atmosphere or methanol, the method comprising the steps of

supplying the gas atmosphere at a fixed flow rate into a furnace,

deriving from an oxygen sensor placed in situ in the furnace a sensed partial pressure of oxygen in the furnace,

deriving from a temperature sensor placed in situ in the furnace a sensed temperature in the furnace, and

deriving, without using a carbon monoxide sensor outside the furnace, a computed partial pressure of carbon monoxide as a function of the sensed partial pressure of oxygen and the sensed temperature.

43 (New). A method according to claim 42

further including the step of deriving a computed activity of carbon value for the gas atmosphere as a function of the sensed temperature, the sensed partial pressure of oxygen, and the computed partial pressure of carbon monoxide.

44 (New). A method according to claim 42

further including the step of deriving a computed activity of carbon value for the gas atmosphere as a function of the sensed temperature, the sensed partial pressure of oxygen, and the computed partial pressure of carbon monoxide, and without reliance upon a carbon dioxide content of the gas atmosphere.

45 (New). A method according to claim 42

further including processing the computed partial pressure of carbon monoxide to derive at least one processing variable.

46 (New). A method according to claim 45

further including comparing the at least one processing variable to a set point to generate a deviation.

47 (New). A method according to claim 46

further including outputting the deviation.



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48 (New). A method according to claim 45

wherein the at least one processing variable includes a computed activity of carbon value.